



New Zealand's emissions reduction target

The introduction of the Climate Change Response (Zero Carbon) Amendment Bill (the bill) represents a significant attempt to make progress on climate policy. As I have previously indicated, any serious attempt, in good faith, to start the economic transformation required by climate change will have my support.

Arriving at a target is a very complex affair. For that reason, I am issuing this note to restate my contributions to this debate to ensure that they are properly understood and used appropriately.

The Government's bill establishes a new greenhouse gas emissions reduction target for 2050. The target is: (i) to reduce net emissions of greenhouse gases other than biological methane to zero by 2050; and (ii) to reduce gross emissions of biological methane emissions from agriculture and waste by 10 per cent by 2030 and by between 24 and 47 per cent by 2050, compared to the 2017 level (see figure 1, blue lines).

The Paris Agreement sets a goal to limit the global temperature increase to well below two degrees Celsius and pursue efforts to limit it to 1.5 degrees Celsius above pre-industrial levels. The stated purpose of the bill is to provide a framework for climate action in New Zealand that is aligned with limiting the global average temperature rise to 1.5 degrees Celsius. The bill's proposed targets for carbon dioxide and biological methane are intended to broadly align with the central range of global scenarios identified by the Intergovernmental Panel on Climate Change (IPCC) as being consistent with staying within 1.5 degrees Celsius of warming,¹ although there are differences in the base year, scope and long-term trajectory.² In these IPCC scenarios, global biological methane emissions from agriculture are reduced by 11-30 per cent by 2030 and 24-47 per cent by 2050, relative to the 2010 level (see figure 1, green lines).

The proposed target in the bill is to be reviewed by the Climate Change Commission. This review, as well as scrutiny of the bill during the forthcoming Parliamentary process, will provide an opportunity to explore the IPCC's global scenarios and their assumptions, and whether or not broadly aligning with the central range of these scenarios is an appropriate target for New Zealand's biological methane from agriculture.

Ideally, the underlying rationale of a target should be consistent across gases. While reference is made to the IPCC's global scenarios relating to biological methane from agriculture, no similar reference is made in respect of nitrous oxide which, like carbon dioxide, is subject to a target of *net* zero by 2050 in the bill. I note that the same IPCC scenarios indicated *gross* reductions of nitrous oxide of up to 26 per cent would be needed by 2050.

¹ IPCC. 2018. *Global warming of 1.5°C*. <https://www.ipcc.ch/sr15/>.

² In the bill, the base year is 2017 and the methane target covers biological methane from agriculture and waste. The long-term trajectories for biological methane and other greenhouse gases are to remain at their 2050 level in each subsequent year. In the IPCC report, the base year is 2010 and the range covers biological methane from agriculture only. The long-term trajectory for net emissions of carbon dioxide falls to below zero after 2050.

As part of the research for my recent *Farms, forests and fossil fuels* report,³ I commissioned some modelling to provide a better understanding of how much warming a given level of biological methane emissions from agriculture causes, and over what timeframe. I decided to release the results in the form of a note⁴ in advance of the full report in the hope that it would result in a debate around emissions reduction targets for methane that was better grounded in the underlying science.

The contribution to global warming from historical and future emissions of methane from New Zealand's ruminant livestock (mostly cows and sheep) was modelled. This included estimating a trajectory for biological methane from agriculture that would generate no additional contribution to warming at any point from here on. The note found that if New Zealand wished to ensure that biological methane from agriculture contributed no additional warming beyond the 2016 level, emissions would need to be reduced by at least 10-22 per cent below 2016 levels by 2050, with further reductions by 2100.

New Zealand's reductions in biological methane from agriculture required to achieve no additional warming from this source depend on the strength of global action. The 22 per cent reduction corresponds to a scenario (called RCP2.6) in which other countries take action to meet the Paris Agreement and there is a better than two-in-three chance of staying below two degrees Celsius and a median warming of 1.6 degrees Celsius. The 10 per cent reduction corresponds to a scenario (called RCP4.5) in which other countries do not take sufficient action to meet the Paris Agreement (see figure 1, red lines). If other countries took greater action to reach a 1.5 degrees Celsius temperature goal, it would be expected that reductions greater than 22 per cent would be required to achieve no additional warming as a result of New Zealand's biological methane from agriculture.

Clearly, an objective of no additional contribution to warming is just one possibility. Different objectives could lead to quite different emphasis being placed on reducing emissions of each gas.

I did not make any recommendations regarding what the level of an emissions reduction target for biological methane should be. This is because modelling results alone cannot answer policy questions about the treatment of biological methane (or any other greenhouse gas for that matter) in target setting or policy implementation. I did, however, stress that the approach taken to target setting must be transparent and robustly grounded in science, as well as being consistent with our national circumstances and our international commitments.

The ranges for biological methane reductions in the year 2050 spelt out in my note and in the Government's bill are *not* directly comparable. This is partly because the trajectories in my note are for biological methane from agriculture only, while the target in the bill is for biological methane from both agriculture and waste. In 2017, biological methane from agriculture accounted for 85 per cent of New Zealand's total methane emissions. Biological methane from waste accounted for 12 per cent.

³ Parliamentary Commissioner for the Environment, 2019. *Farms, forests and fossil fuels: The next great landscape transformation?* Parliamentary Commissioner for the Environment: Wellington.

⁴ Parliamentary Commissioner for the Environment, 2018. *A note on New Zealand's methane emissions from livestock*. Parliamentary Commissioner for the Environment: Wellington.

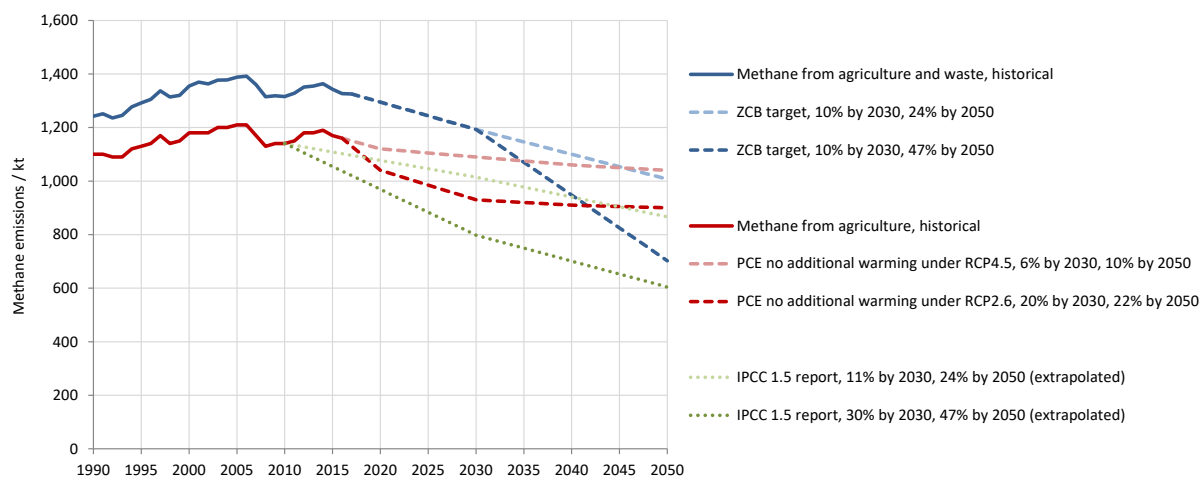


Figure 1. Trajectories for New Zealand’s biological methane emissions in my note, the Zero Carbon Bill and the IPCC report on 1.5 degrees Celsius (if the IPCC global trajectories are simply extrapolated to the New Zealand context).

As figure 1 shows, the emissions trajectories implied by my note and the Government’s bill have different shapes. The trajectories in my note were not adjusted to meet any technological or economic constraints. They imply around a 20 per cent reduction from the 2016 level by 2030. For comparison, the IPCC central range of trajectories aligned with a 1.5 degrees Celsius goal imply an 11-30 per cent reduction in biological methane emissions from agriculture by 2030 compared to the 2010 level. The bill proposes a 10 per cent reduction from the 2017 level by 2030.

The trajectories needed to achieve no additional warming in a RCP2.6 scenario or align with a 1.5 degrees Celsius temperature goal are particularly stringent before 2030. The trajectory outlined in the bill requires less stringent annual reductions before 2030. A 24 per cent by 2050 target would require similar annual reductions to continue after 2030, while a 47 per cent by 2050 target would entail steeper annual reductions.

Targets and policies for biological methane cannot be discussed in isolation from action to address the other main anthropogenic greenhouse gases. This is why in my *Farms, forests and fossil fuels* report I took a broader view and examined how best to address sources and sinks of carbon dioxide, nitrous oxide and methane in all sectors.

My alternative approach proposed a target of zero fossil emissions by the second half of the century consistent with the language of the Paris Agreement and the underlying science. This target would exclude forestry offsets because of the difficulty of guaranteeing their permanence, uncertainty about the magnitude of their offsetting climate benefits and the delay they would represent in making gross fossil emissions reductions.

I proposed a separate target for emissions of biological methane and nitrous oxide, concluding that while both methane and nitrous oxide emissions have to be reduced, neither necessarily has to be reduced to zero. I did not propose a level of ambition for a biological emissions target, believing this required further analysis and advice. However, because these gases are shorter-lived in comparison to carbon dioxide, I proposed that any biological emissions target *could* be offset with forests. Table 1 shows the different use of net and gross trajectories between the IPCC report on 1.5 degrees Celsius, the bill and my proposed approach.

Table 1. Use of net and gross trajectories in the IPCC report on 1.5 degrees Celsius, the Zero Carbon Bill and my proposed approach.

	IPCC report	Zero Carbon Bill	PCE
Carbon dioxide	Net	Net	Gross ⁵
Methane	Gross	Gross	Net
Nitrous oxide	Gross	Net	Net

To understand the impact of different levels of ambition, I modelled reductions ranging from 20 to 100 per cent. Offsetting 100 per cent of whatever biological emissions are released, together with zero fossil emissions by the second half of the century, would amount to a 'net zero' policy. But even a level less than 100 per cent would be ambitious compared with where we are today.

The Government's bill explicitly responds to the Paris Agreement's call to pursue efforts to limit the global temperature increase to 1.5 degrees Celsius. I note that the alternative approach I elaborated could equally be applied to the 1.5 degrees Celsius goal, for example by shifting the target year forward.

I welcome further opportunities to discuss these and other details with Members of Parliament and stakeholders as the bill progresses through Parliament.

⁵ A limited quantity of international units could be used.